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Indian Standard
DIMENSIONS FOR PANEL MOUNTED INDICATING AND RECORDING ELECTRICAL INSTRUMENTS

(First Revision)

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Gr 4 *August* 1979

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DIMENSIONS FOR PANEL MOUNTED INDICATING AND RECORDING ELECTRICAL INSTRUMENTS
(First Revision)

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Indian Standard

DIMENSIONS FOR PANEL MOUNTED INDICATING AND RECORDING ELECTRICAL INSTRUMENTS

(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 25 January 1979, after the draft finalized by the Electrical Instruments Sectional Committee had been approved by the Electrotechnical Division Council.

0.2 This standard was originally published in 1963 with a system of dimensions based on a module of 12 mm. Since then, considerable progress has been made at the international level and a system of dimensions based on a module of 12·5 mm, wherein size is related to the maximum panel space required for an instrument has been evolved. This revision of the standard has been brought out to line up the system of dimensions with the IEC standards as far as practicable. The only deviation from the IEC standard being in respect of the inclusion of round flanged instruments which are not covered in the IEC standard but for which considerable manufacture and demand still exists in this country.

0.3 The object of this standard is to establish dimensional interchangeability between instruments made by different manufacturers. To fulfil this requirement, it is preferable to use a modular system as a basis for dimensions. It is easier to reach international agreement upon a logical series of values than upon an uninterrelated and arbitrary one, and instruments of different sizes could easily be combined on the same panel making good use of the available panel space and producing a satisfactory layout.

0.3.1 Indicating and recording instruments are often used together, mounted on the same panel. Moreover, these instruments can be used together with industrial process control instruments. For users, harmonization between different types of apparatus is desirable.

0.4 In this standard, the basis adopted for standardized values of size is the modular system of $N \times 12 \cdot 5$ mm, where N is the whole number. The value of 12·5 mm has been selected as the basis of the modular system. One reason for this choice is that a standard 482 mm panel having a free space of 450 mm may be conveniently used for instruments of sizes 50, 75, 112·5, 150 and 225 mm.

0.5 Users of this standard are expected that they shall changeover to the dimensions specified in this standard by 31 December 1980.

0.6 While preparing this standard, considerable assistance has been derived from IEC Pub 473 (1974) ' Dimensions for panel mounted indicating and recording electrical measuring instruments ' published by the International Electrotechnical Commission.

0.7 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard lays down a system of dimensions for electrical and electrically operated indicating measuring instruments of the panel type.

NOTE 1 — Dimensions of recording instruments are under consideration.

NOTE 2 — This system of standardization is intended to limit number of sizes, but not to restrict future technical change. Therefore in the future, some sizes may be deleted, if it is found that they are not used in current practice. On the other hand, other sizes may be added provided that they are in accordance with this modular system.

1.1.1 It applies to the following types of instruments with protruding flanges:

a) Square indicating instruments with round housing,

b) Rectangular indicating instruments with round housing,

c) Square indicating instruments with square housing,

d) Rectangular indicating instruments with rectangular housing, and

e) Round indicating instruments with round housing.

1.1.2 It also applies to rectangular indicating instruments with rectangular housing without continuous flange.

---

*Rules for rounding off numerical values (*revised*).

1.2 For the present, forward and backward projections of instruments are not within the scope of this standard.

NOTE 1 — The depth behind the panel is particularly important when constructing instruments, racks and cabinets.

NOTE 2 — Instruments may be mounted in different ways: either individually on the panel using bolts or other fixing devices, the housing of the instrument fitting into the cut-out; or collectively in a common cut-out (for example, 'shelf mounting').

2. TERMINOLOGY

2.0 For the purpose of this standard, the following definitions shall apply.

2.1 Module — The quotient of the difference between two consecutive dimensions and a whole number.

NOTE — The module of 12·5 mm in the case of instruments with sizes 37·5, 50, 75, 112·5 mm is illustrated below:

The quotient $\frac{50-37{\cdot}5}{1} = 12{\cdot}5$ mm, $\frac{75-50}{2} = 12{\cdot}5$ mm, $\frac{112{\cdot}5-75}{3} = 12{\cdot}5$ mm

where

1, 2, 3, etc, are whole numbers.

2.2 Size — Nominal values which are the maximum panel space values of width and height needed for the instrument.

2.3 Flange — The front projecting surface or rim around the housing of the instrument in front of or behind the panel.

NOTE — Flanges may be fixed or removable.

2.4 Flange Dimensions — The overall width and height of the flange.

2.5 Instrument with Continuous Flange — An instrument with flange on two opposite sides, only for mounting.

2.6 Cut-Out — The hole in the panel into which the housing of the instrument is intended to be inserted.

2.7 Fixing Holes — Those holes in the panel through which the fixing means may be inserted and secured.

3. PRINCIPLES

3.0 General — The size of the instrument serves as a basis for defining the various dimensions which permit interchangeability of the instrument.

3.1 Cut-Out Dimensions — For cut-out dimensions, only positive tolerances are given.

3.2 Overall Dimensions — The overall dimensions of the instrument including the flange and fixing means, shall be at least 1 mm less than the size to provide for the necessary manufacturing and mounting tolerances.

Example:

For the size 75 × 62·5 mm, the maximum width is 74 mm, the maximum height is 61·5 mm.

3.2.1 This 1 mm difference does not apply on the sides with no flange for instruments without continuous flange (*see* **4.4.2**).

3.3 Flange Dimensions — Minimum values for flange dimensions are not specified in the tables. Flanges shall be of a size suitable for covering the maximum cut-out, and where appropriate, the fixing holes (*see* **A-1**).

3.4 Centre-to-Centre Dimensions — To ensure interchangeability, where two or more instruments are mounted adjacent to each other, the minimum value of the centre-to-centre dimensions is equal to half the sum of the corresponding size values.

3.5 Instruments in a Common Cut-Out — Instruments that are mounted together in a common cut-out may be mounted without gaps (*see* **A-2**). Then the entire group shall be considered as one instrument only, and the minimum distances from one group to another group or another instrument shall be those corresponding to the size of the entire group. The dimensions of the common cut-out and the fixing means shall be agreed by those concerned.

4. SIZES

4.0 Symbols — In the tables and drawings, the following symbols are used:

$A_1 \times A_2$ = size (width × height)
B = cut-out diameter
$B_1 \times B_2$ = cut-out dimensions (width × height)
$C_1 \times C_2$ = distance between fixing holes (horizontal × vertical)
D = diameter of fixing holes

4.0.1 The first dimension of the size is width, and the second is the height.

4.0.2 If only two panel fixing holes are used, the upper left and the lower right holes as seen from the front are used.

4.0.3 The tolerances for C_1 and C_2 shall be in accordance with IS : 2102-1969*.

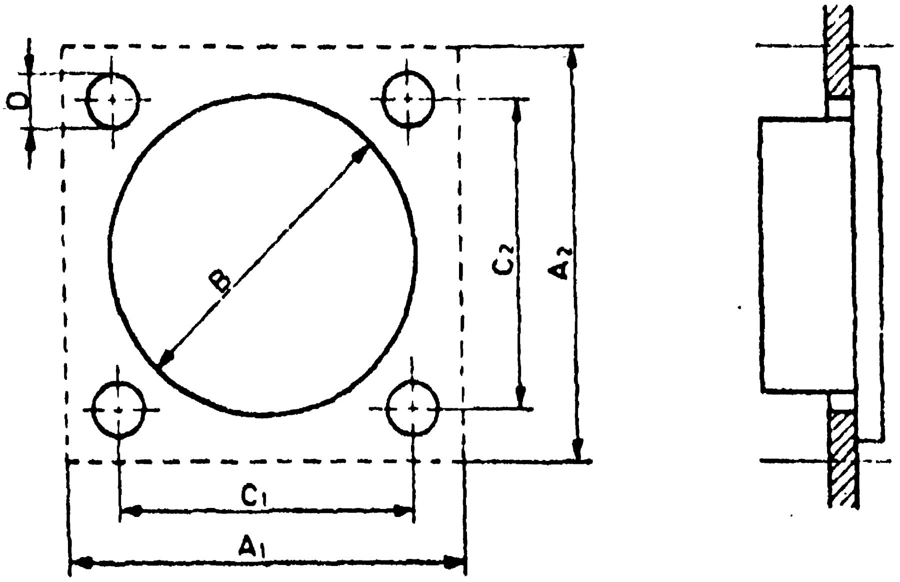
---

*Allowable deviations for dimensions without specified tolerances (*first revision*).

4.1 Square Indicating Instrument with Round Housing — The dimensions are given in Table 1.

TABLE 1 SQUARE INSTRUMENT WITH ROUND HOUSING

All dimensions in millimetres.



Cut-out, front view, and instrument mounting, side view

Size $A_1 \times A_2$	Cut-Out		Fixing Holes (if any)		
	Diameter B	Tolerance	Number	Diameter D	Distance $C_1 \times C_2$
(1)	(2)	(3)	(4)	(5)	(6)
37·5 × 37·5	31	+ 0·6	—	—	—
50 × 50	42·5	+ 0·6	2	4	37 × 37
62·5 × 62·5	57	+ 0·7	2	4	47 × 47
75 × 75	68	+ 0·7	2	4	57 × 57
87·5 × 87·5	78	+ 0·8	2	4	66 × 66
100 × 100	92	+ 0·8	2	4·5 (8·5)	78 × 78
112·5 × 112·5	102	+ 0·9	4	4·5 (8·5)	89 × 89
125 × 125	115	+ 0·9	4	4·5 (8·5)	100 × 100
150 × 150	138	+ 1·0	4	5·5 (8·5)	120 × 120
175 × 175	162	+ 1·0	4	5·5 (8·5)	140 × 140
200 × 200	186	+ 1·1	4	5·5 (8·5)	160 × 160
225 × 225	210	+ 1·2	4	5·5 (8·5)	180 × 180
250 × 250	234	+ 1·2	4	5·5 (8·5)	200 × 200
300 × 300	282	+ 1·3	4	6·7 (8·5)	240 × 240

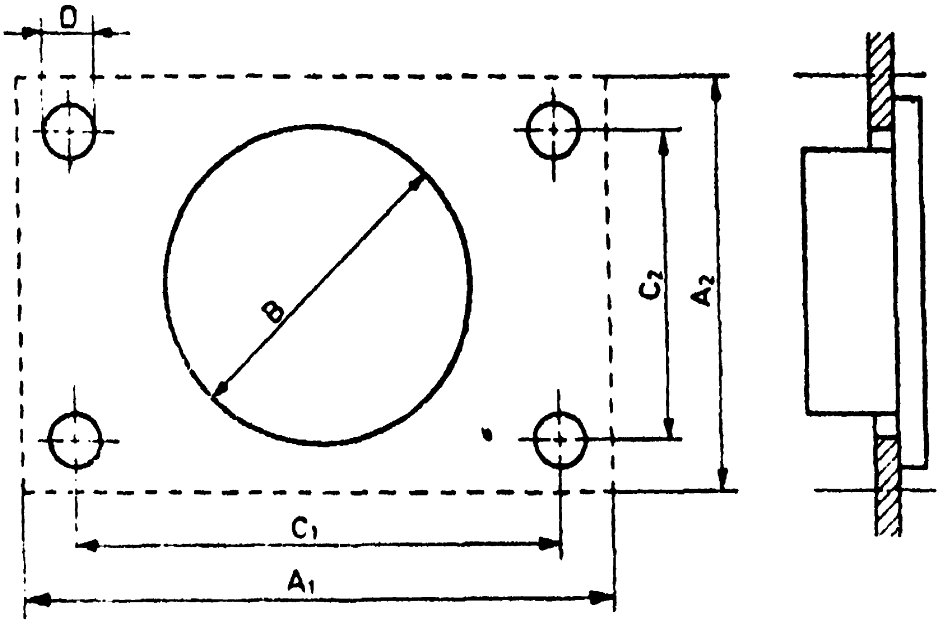
NOTE — For 'high shockproof' instruments, the values for hole diameter within parentheses may be used.

4.2 Rectangular Indicating Instrument with Round Housing

4.2.1 *With Central Cut-out* — The dimensions are given in Table 2.

TABLE 2 RECTANGULAR INSTRUMENT WITH ROUND HOUSING (CENTRAL CUT-OUT)

All dimensions in millimetres.



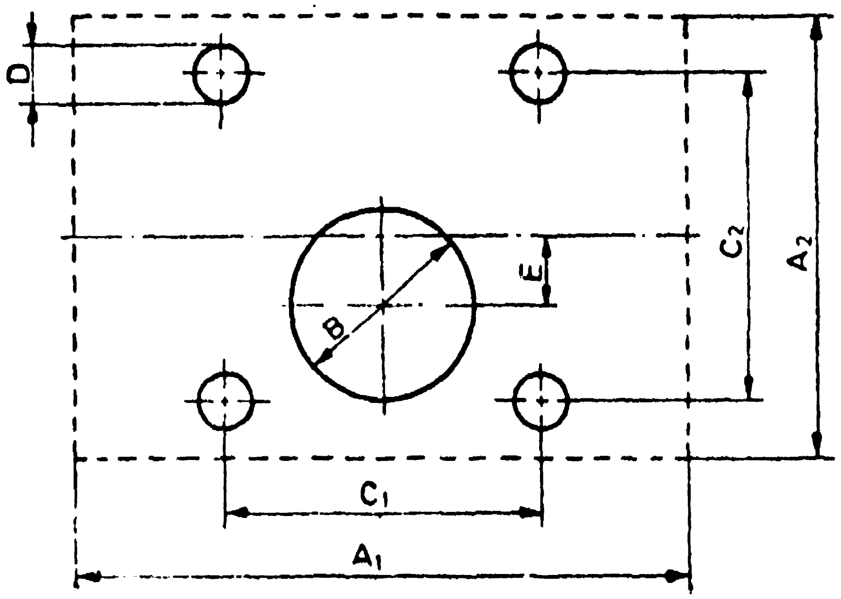
Cut-out front view, and instrument mounting, side view

Size $A_1 \times A_2$	Cut-Out: Diameter B	Cut-Out: Tolerance	Fixing Holes (if any): Number	Fixing Holes (if any): Diameter D	Fixing Holes (if any): Distance $C_1 \times C_2$
(1)	(2)	(3)	(4)	(5)	(6)
75 × 62·5	57	+ 0·7	2	4	47 × 47
100 × 75	68	+ 0·7	2	4	57 × 57
100 × 87·5	78	+ 0·8	2	4	66 × 66
112·5 × 100	92	+ 0·3	2	4·5	78 × 78
125 × 100	92	+ 0·8	2	4·5	78 × 78
125 × 112·5	102	+ 0·9	4	4·5	89 × 89
150 × 125	115	+ 0·9	4	4·5	100 × 100
200 × 150	138	+ 1·0	4	5·5	120 × 120
212·5 × 175	162	+ 1·0	4	5·5	140 × 140
225 × 187·5	170	+ 1·1	4	5·5	150 × 150

4.2.2 *With Offset Cut-out* — The dimensions are given in Table 3.

TABLE 3 RECTANGULAR INSTRUMENT WITH ROUND HOUSING (OFFSET CUT-OUT)

All dimensions in millimetres.



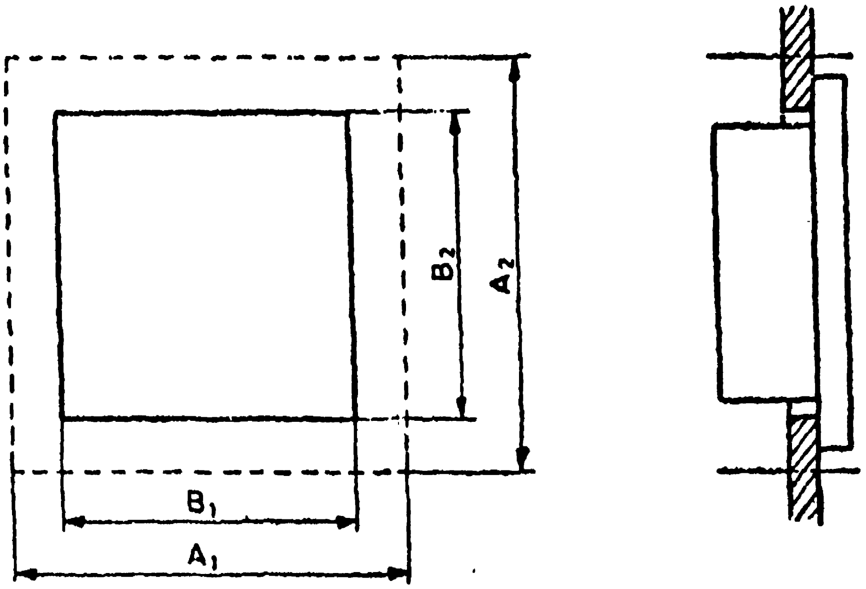
Cut-out, front view, and instrument mounting, side view

Size	Cut-Out			Fixing Holes (if any)		
$A_1 \times A_2$	Diameter B	Tolerance	Offset E	Number	Diameter D	Distance $C_1 \times C_2$
(1)	(2)	(3)	(4)	(5)	(6)	(7)
112·5 × 100	75	+ 0·8	7	2	4·7	78 × 78
125 × 100	75	+ 0·8	7	2	4·7	78 × 78
125 × 112·5	75	+ 0·8	12	4	4·7	89 × 89
150 × 125	75	+ 0·8	18	4	4·7	100 × 100
200 × 150	75	+ 0·8	20	4	4·7	120 × 120
212·5 × 175	75	+ 0·8	39	4	5·8	140 × 140
225 × 187·5	75	+ 0·8	44	4	5·8	150 × 150

4.3 Square Indicating Intruments with Square Housing — The dimensions are given in Table 4.

TABLE 4 SQUARE INSTRUMENT WITH SQUARE HOUSING

All dimensions in millimetres.



Cut-out, front view, and instrument mounting, side view

Size $A_1 \times A_2$	Cut-Out Dimensions $B_1 \times B_2$	Cut-Out Tolerance
(1)	(2)	(3)
37·5 × 37·5	33 × 33	+ 0·6
50 × 50	45 × 45	+ 0·6
75 × 75	68 × 68	+ 0·7
100 × 100	92 × 92	+ 0·8
150 × 150	138 × 138	+ 1·0
175 × 175	162 × 162	+ 1·0
200 × 200	186 × 186	+ 1·1
250 × 250	234 × 234	+ 1·2
300 × 300	282 × 282	+ 1·3

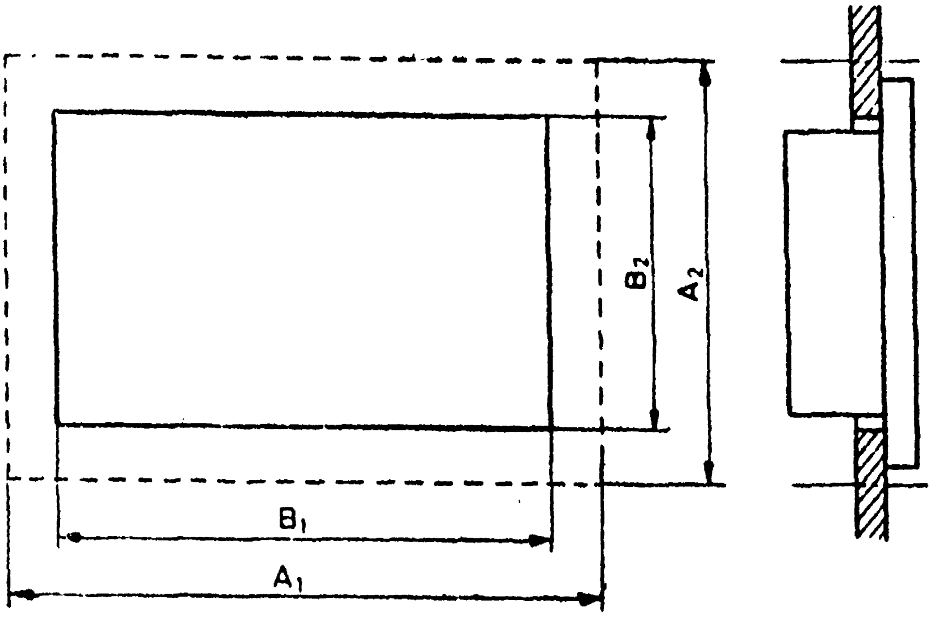
Note — The instruments covered in this table are suitable for clamping at the rear.

4.4 Rectangular Indicating Instrument with Rectangular Housing

4.4.1 *Rectangular Indicating Instrument with Rectangular Housing and Continuous Flange* — The dimensions are given in Table 5.

TABLE 5 RECTANGULAR INSTRUMENT WITH RECTANGULAR HOUSING AND CONTINUOUS FLANGE

All dimensions in millimetres.



Cut-out, front view, and instrument mounting, side view

Size $A_1 \times A_2$	Cut-Out and Tolerance	
	B_1	B_2
(1)	(2)	(3)
50 × 25	45 + 0·6	22·2 + 0·3
75 × 37·5	68 + 0·7	33 + 0·6
100 × 50	92 + 0·8	45 + 0·6
150 × 75	138 + 1·0	68 + 0·7
200 × 100	186 + 1·1	92 + 0·8
300 × 150	282 + 1·3	138 + 1·0
25 × 50	22·2 + 0·3	45 + 0·6
37·5 × 75	33 + 0·6	68 + 0·7
50 × 100	45 + 0·6	92 + 0·8
75 × 150	68 + 0·7	138 + 1·0
100 × 200	92 + 0·8	186 + 1·1
150 × 300	138 + 1·0	282 + 1·3

Note — Other combinations of width and height may be chosen provided that the values are selected from those given in Table 5.

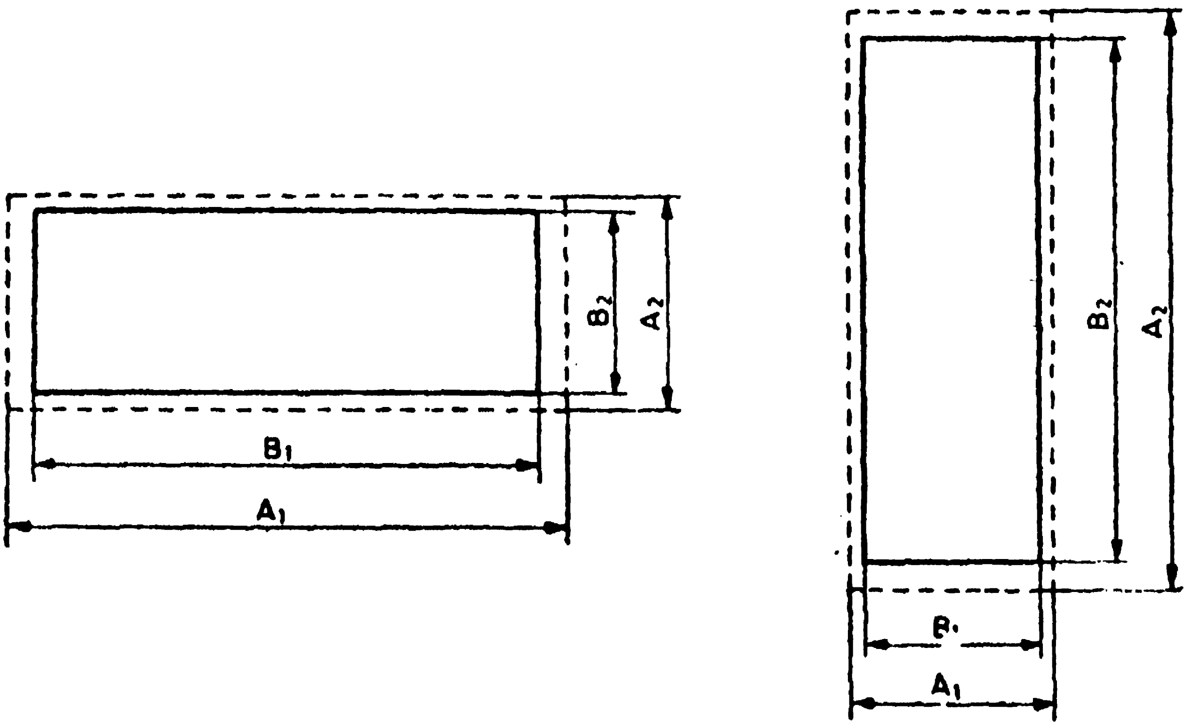
Example:

For size 200 × 50 mm, the cut-out dimensions are 186 × 45 mm.

4.4.2 *Rectangular Indicating Instrument With Rectangular Housing Without Continuous Flange* — The dimensions are given in Table 6.

TABLE 6 RECTANGULAR INSTRUMENT WITH RECTANGULAR HOUSING WITHOUT CONTINUOUS FLANGE

All dimensions in millimetres.



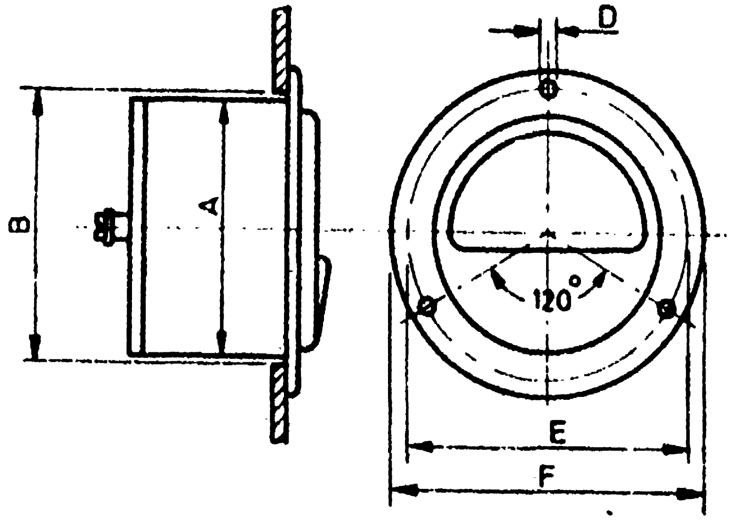
SIZE $A_1 \times A_2$ (1)	CUT-OUT AND TOLERANCE B_1 (2)	CUT-OUT AND TOLERANCE B_2 (3)	
75 × 25	68 + 0·7	24·5 + 0·5	Horizontal
112·5 × 37·5	102 + 0·9	36·9 + 0·6	
150 × 50	138 + 1·0	49·4 + 0·6	
225 × 75	210 + 1·2	74·3 + 0·7	
300 × 100	282 + 1·3	99·2 + 0·8	
25 × 75	24·5 + 0·5	68 + 0·7	Vertical
37·5 × 112·5	36·9 + 0·6	102 + 0·9	
50 × 150	49·4 + 0·6	138 + 1·0	
75 × 225	74·3 + 0·7	210 + 1·2	
100 × 300	99·2 + 0·8	281 + 1·3	

NOTE — Other combinations of width and height may be chosen provided that the values are selected from those given in Table 6.

4.5 Round Indicating Instruments with Round Housing — The dimensions are given in Table 7.

TABLE 7 ROUND INDICATING INSTRUMENTS WITH ROUND HOUSING

All dimensions in millimetres.



Size (Casing Diameter) A Max	Cut-Out Diameter B	Fixing Hole (if any) Diameter D	Flange Diameter F	Pitch Circle Diameter E
(1)	(2)	(3)	(4)	(5)
40	41	2·5	50	44
50	51	2·8	63	56
65	66	3·6	83	73
80	82	4·0	100	92
110	112	—	130	—
168	170	—	188	—
200	203	—	235	—
250	255	—	285	—

Note — Instruments having dimension *A* of 110, 168, 200 and 250 mm shall be clamped at the rear.

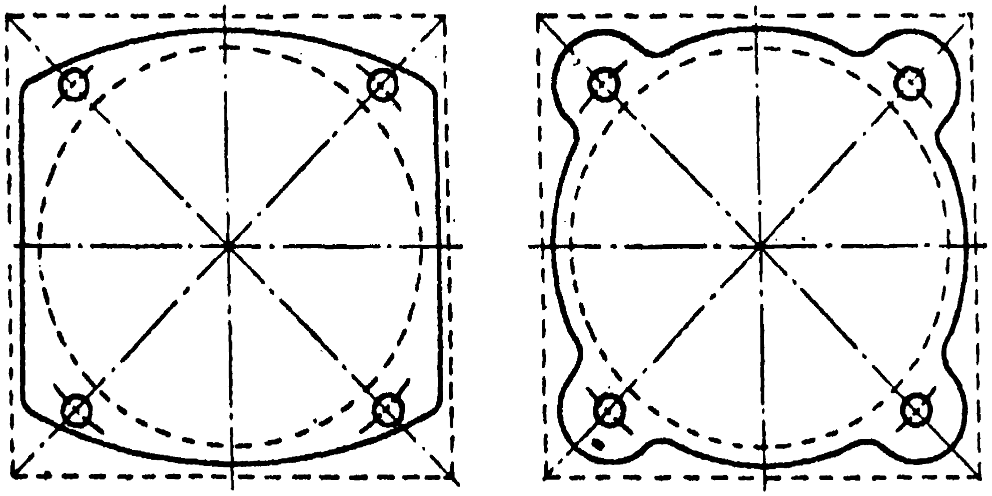
APPENDIX A

(*Clauses* 3.3 *and* 3.5)

TYPES OF FLANGES AND MOUNTING IN A COMMON CUTOUT

A-1. DIFFERENT TYPES OF FLANGES OF THE SAME SIZE HAVING CENTRAL OR OFFSET HOUSINGS

A-1.1 The location of the housing in relation to the flange is not specified, except that the housing fits into the cut-out when mounted. The flange may have a different form (Fig. 1A and 1B) or the housing may be offset (Fig. 2).



1A

1B

Fig. 1 Different Forms of Flange with Central Housing

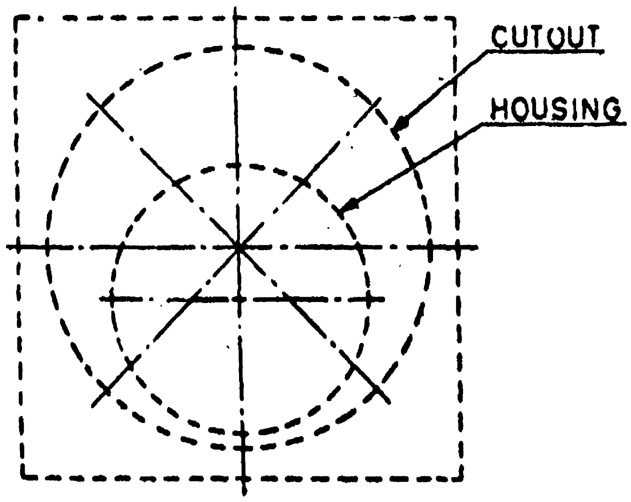
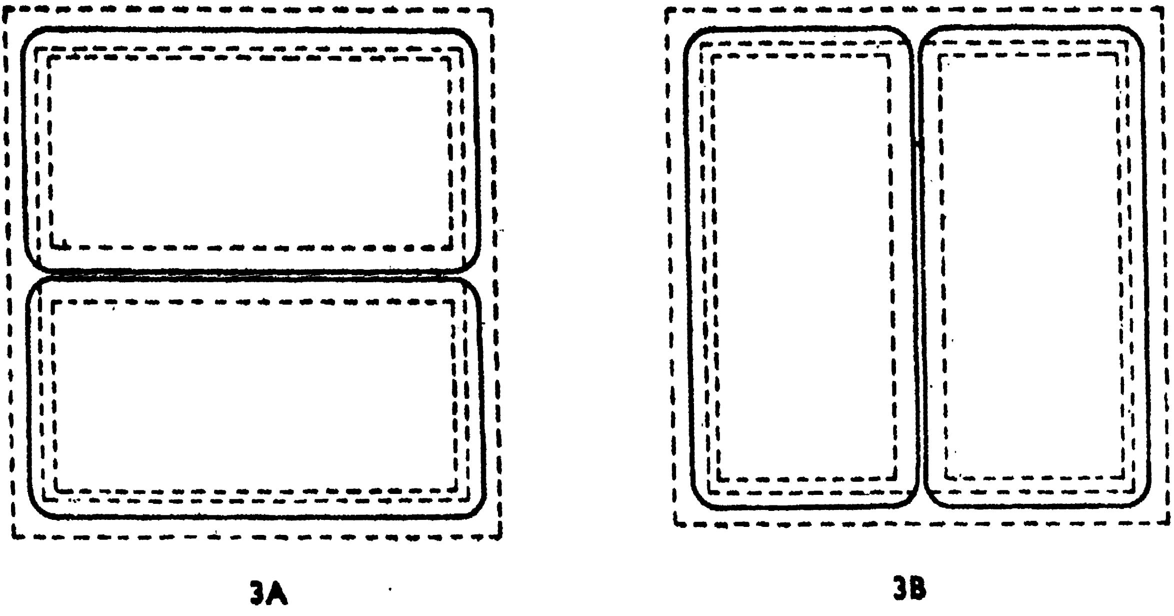


Fig. 2 Flange with Offset Housing

A-2. MOUNTING IN A COMMON CUT-OUT

A-2.1 Two instruments of size 75 × 37·5 mm (Fig. 3A) and 37·5 × 75 mm (Fig. 3B) mounted in a common cut-out. The cut-out dimensions depend upon flange and housing dimensions.


3A

3B

Fig. 3 Rectangular Instruments in a Common Cut-Out

A-2.2 A group of four instruments of size 25 × 75 mm (according to Table 6) mounted in a common cut-out. A square instrument with round housing of size 75 × 75 mm is mounted adjacent to this group.

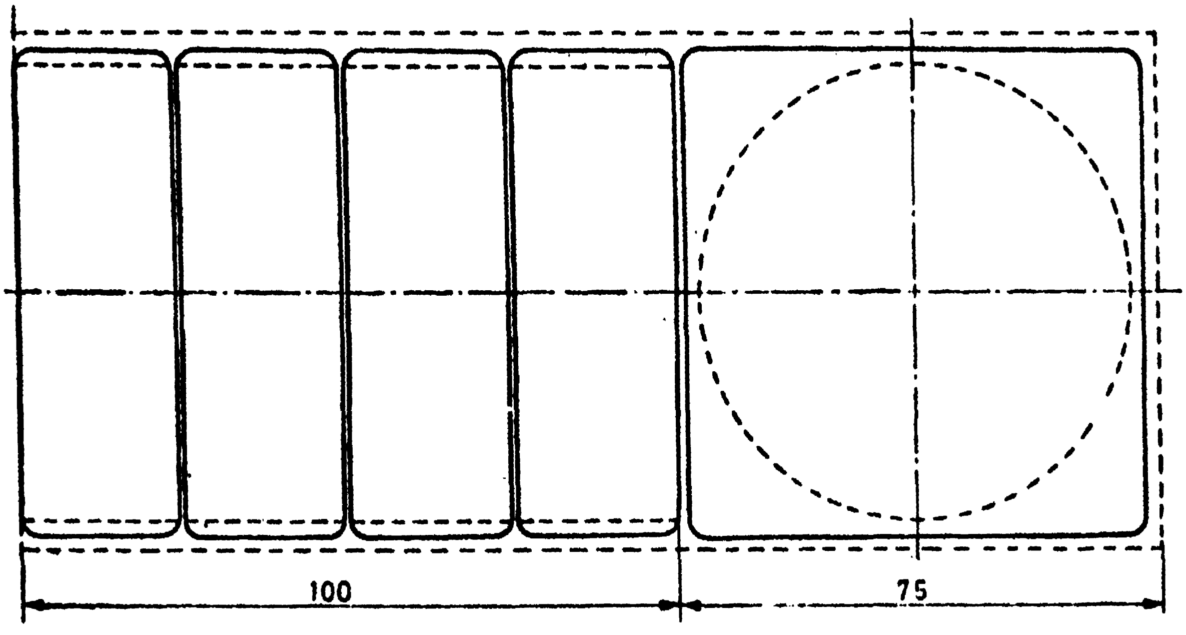


Fig. 4 Rectangular and Square Instruments in a Common Cut-Out

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Institution of Engineers (India) Building, 1332 Shivaji Nagar, PUNE 411005	5 24 35

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*Sales Office in Calcutta is at 5 Chowringhee Approach, P. O. Princep Street, Calcutta 700072 27 68 00

†Sales Office in Bombay is at Novelty Chambers, Grant Road, Bombay 400007 89 65 28

‡Sales Office in Bangalore is at Unity Building, Narasimharaja Square, Bangalore 560002 22 36 71

Reprography Unit, BIS, New Delhi, India